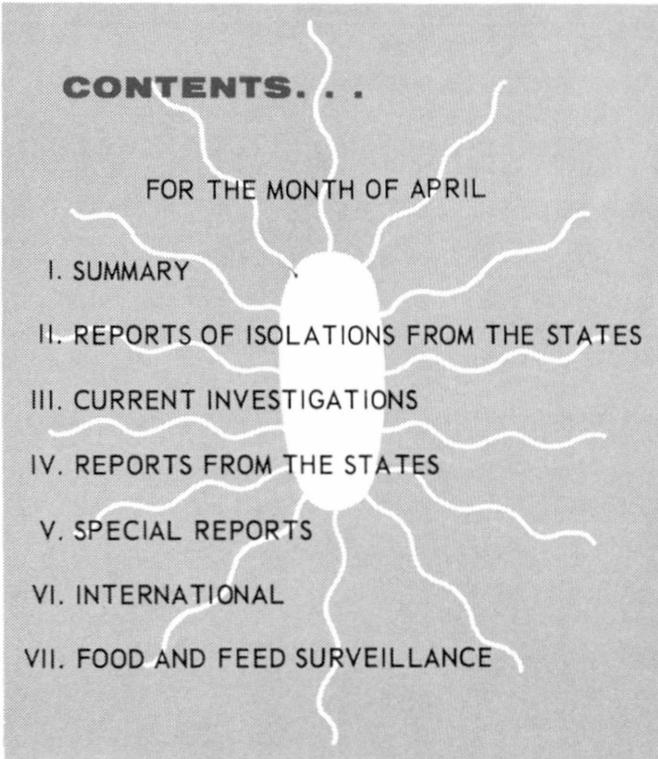


NATIONAL
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE



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FOR THE MONTH OF APRIL

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PREFACE

Summarized in this report is information received from State and City Health Departments, university and hospital laboratories, the National Animal Disease Laboratory (USDA, ARS), Ames, Iowa, and other pertinent sources, domestic and foreign. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Surveillance Report are most welcome. Please address

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I. SUMMARY

This issue of the Salmonella Surveillance Report includes summaries of a large interstate epidemic due to kosher desserts made with contaminated unpasteurized egg products, an outbreak due to consumption of raw milk, and a typhoid fever epidemic in Louisiana.

In April 1967, 1,256 isolations of salmonellae were reported from humans, an average of 314 isolations per week (Tables I and II). This number represents an increase of 32 (11.3 percent) over the weekly average of March 1967 and a decrease of 2 (0.6 percent) from the weekly average of April 1966.

Reports of 659 nonhuman isolations of salmonellae were received during April, a decrease of 223 (25.3 percent) from March 1967 (Tables IV, V, and VI).

II. REPORTS OF ISOLATIONS FROM THE STATES

A. HUMAN

The seven most frequently reported serotypes during April were:

<u>Rank</u>	<u>Serotype</u>	<u>Number</u>	<u>Percent</u>	<u>Rank Last Month</u>
1	<u>S. typhi-murium</u> and <u>S. typhi-murium var.</u> <u>copenhagen</u>	396	31.5	1
2	<u>S. heidelberg</u>	136	10.8	2
3	<u>S. enteritidis</u>	92	7.3	4
4	<u>S. blockley</u>	65	5.2	7
5	<u>S. infantis</u>	62	4.9	3
6	<u>S. typhi</u>	53	4.2	6
7	<u>S. newport</u>	45	3.6	5
	Total	849	67.6	
	Total (all serotypes)	1256		

The age and sex distribution is shown in Table III.

Salmonella heidelberg is again ranked second this month, and the continued large numbers of isolations of this serotype from Los Angeles County, California, remain unexplained.

Human Isolations of Salmonella heidelberg, 1967

	<u>Los Angeles County</u>	<u>California</u>	<u>Total USA</u>
January	4	11	117
February	6	9	106
March	27	36	142
April	29	36	136

B. NONHUMAN

Thirty states reported nonhuman isolations of salmonellae, in which 55 different serotypes were represented.

The seven most frequently reported serotypes during April were:

<u>Rank</u>	<u>Serotype</u>	<u>Predominant Source and Number</u>	<u>Number</u>	<u>Percent</u>	<u>Rank Last Month</u>
1	<u>S. saint-paul</u>	swine (79)	110	16.7	Not listed
2	<u>S. typhi-murium</u> and <u>S. typhi-murium var. copenhagen</u>	swine (13), water (13), and cattle (10)	85	12.9	1
3	<u>S. heidelberg</u>	turkeys (34)	58	8.8	3
4	<u>S. anatum</u>	dry milk (15) and bone meal/meat scraps (14)	54	8.2	5
5	<u>S. senftenberg</u>	bone meal/meat scraps (16)	27	4.1	Not listed
6	<u>S. derby</u>	swine (10)	25	3.8	2
7	<u>S. infantis</u>	bone meal/meat scraps (8)	23	3.5	4
	Total		382	58.0	
	Total (all serotypes)		659		

The most prominent nonhuman sources of salmonellae reported during April were swine, 123 (18.7 percent); turkeys, 109 (16.5 percent); bone meal/meat scraps, 54 (8.2 percent); dry milk, 51 (7.7 percent); and chickens, 35 (5.3 percent).

III. CURRENT INVESTIGATIONS

Interstate Outbreak Traced to a Kosher Dessert

Reported by Dr. Harold T. Fuerst, Assistant Commissioner of Health, Preventable and Chronic Disease Services, and Dr. Tibor Fodor, Chief, Division of Epidemiology and Diagnosis, City of New York Department of Health; Mr. Weimes Clevenger, New York District Director, Food and Drug Administration; Dr. Julia L. Freitag, Director, Office of Epidemiology, New York State Department of Health; Dr. Barbara W. Christine, Chief, Epidemiology Section, Connecticut State Department of Health; Dr. W. J. Dougherty, Director, Division of Preventable Diseases, New Jersey State Department of Health; Dr. Dean H. Fisher, Commissioner, Maine Department of Health and Welfare; Drs. Robert Armstrong and George Curlin, EIS Officers, Bacterial Diseases Section, Epidemiology Program, NCDC; Dr. Allen Cohen, EIS Officer assigned to Department of Microbiology, University of Maryland; Dr. A. W. Karchmer, EIS Officer assigned to the New Jersey State Department of Health; and Dr. Raymond Moldow, EIS Officer assigned to the Connecticut State Department of Health.

A kosher imitation ice cream has been implicated as the cause of 14 outbreaks of febrile gastroenteritis in New York, New Jersey, Connecticut, and Maine during the first 3 weeks in April 1967. Each outbreak occurred 1 to 3 days after a catered banquet at which kosher food was served. Of approximately 3,300 persons who attended the banquets, an estimated 1,800 (54 percent) developed diarrhea, abdominal pain or cramps, fever, chills, headache, nausea, and vomiting. The median duration of illness was 3 days. There were no deaths.

Salmonellae have been isolated from stool specimens of individuals from 10 of the banquets. Of the 27 positive samples collected to date, 15 have contained Salmonella typhi-murium, 6 S. braenderup, 3 S. typhi-murium var. copenhagen, and 3 samples have yielded all 3 serotypes.

Officials of the New York City Health Department compared menus from the initial outbreaks and found that an imitation ice cream, a non-dairy product, was the only food item common to all menus. Food histories from persons attending the banquets confirmed this product as the food responsible for the outbreak. It is estimated that 60,000 servings of this frozen dessert, which is manufactured by a single business firm in New York City, were produced and distributed during the first 3 weeks in April. Cultures from the "ice cream" left over from various banquets have yielded S. typhi-murium, S. typhi-murium var. copenhagen, S. braenderup, or various combinations of these organisms. Inspection of the ice cream plant disclosed that the manufacturing process for the imitation ice cream began with a mixture of sugar, vegetable oils, vegetable gum, and water. Although the mixture was supposed to be heated to 150° - 160° for 30 minutes, the temperature gauge mechanism was found to be defective and the actual temperature reached was unknown. The next step was the addition of chilled starch and thawed frozen egg yolks. The mixture was then allowed to cool overnight. The next morning flavoring, coloring, and thawed frozen fruit were added, and then the mixture was immediately frozen and formed into individually shaped desserts. All environmental and employee cultures were negative for salmonellae. All ingredients used in the dessert were negative for salmonellae except for the frozen egg yolks, which yielded S. typhi-murium and S. braenderup.

The contaminated frozen egg yolks were traced to an unpasteurized product manufactured locally in New York City. This company relied almost exclusively on checked eggs (approximately 97 percent) purchased from suppliers who receive their eggs from farms in Connecticut, New Jersey, Pennsylvania, and New York. Environmental and production line samples taken at the egg-breaking plant revealed 26 of 58 samples positive for salmonella. Serotypes identified were S. reading, S. braenderup, S. alachua, S. siegburg, S. montevideo, S. typhi-murium, S. thompson, and S. infantis. Employee cultures detected 1 asymptomatic carrier of S. braenderup.

Studies still in progress include quantitation of the salmonella contamination in the frozen eggs and ice cream and an evaluation of local egg producers by the Connecticut and New Jersey State Departments of Health.

A number of steps have been initiated to prevent such outbreaks in the future. As soon as the imitation ice cream product was clearly implicated as causing the present outbreak, the manufacturer of the product was required by the Health Department of New York City to suspend all operations. The firm has since reopened but is not producing products containing eggs, and it is being closely supervised by city sanitarians. In addition, the New York City Health Department has placed all imitation ice cream manufacturers under the city milk code, which will require production of a certified pathogen-free product. Consideration is also being given to a new regulation that will require all egg-breaking operations in New York City to pasteurize raw egg products.

EDITOR'S COMMENT: This is a good example of a thoroughly investigated outbreak. Unpasteurized egg products made from pooled checked eggs are prime vehicles for salmonella contamination. Although the United States Department of Agriculture has recently passed regulations requiring pasteurization of all egg products, these regulations pertain only to interstate products, and the regulation of egg products with exclusively intrastate distribution is dependent on the individual states. The Poultry and Egg National Board Salmonella Committee recently met in Atlanta and recommended state passage of the USDA regulations. The full text of the announcement is listed under Section V, Special Reports, in this issue of the Salmonella Surveillance Report.

IV. REPORTS FROM THE STATES

A. WASHINGTON

Salmonella typhi-murium Outbreak Traced to Ingestion of Raw Milk

Reported by Byron J. Francis, M.D., Head, Communicable Disease Control Section, Jack Allard, M.P.H., Associate Epidemiologist, and Stephen M. Jones, D.V.M., EIS Officer, Washington State Department of Health.

An outbreak of gastroenteritis extending over a 15-week period and involving at least 40 persons, 33 of whom were hospitalized, occurred recently in Yakima County, Washington. Symptoms included fever, nausea, vomiting, cramps, and diarrhea. Slightly more than 50 percent of the cases were under 10 years of age, and the sex distribution was 23 males and 17 females. No deaths were reported, although 1 case of meningitis occurred in a newborn infant whose mother had been symptomatic at time of delivery. All of the 39 patients cultured were found to be positive for Salmonella typhi-murium. Interviews with the initial 15 cases disclosed that 8 had purchased raw milk from a local dairy which furnishes 1 percent of the milk supply to the involved area.

The dairy was visited and cultures were taken from the cows, calves, milk, water, feeds, farm workers, and environment. S. typhi-murium was isolated in milk obtained from three cows, in the feces of one calf, and in the creek water that serves as the water supply for the cattle. Extensive samplings of the stream revealed that it contained large numbers of S. typhi-murium throughout its entire 15-18 mile course. A dead calf, in a gunnysack, was found in the stream just above the first positive sample station. S. typhi-murium was found in the stool collected from the calf, but samples taken from the body cavities of the calf were negative for salmonella, possibly due to extensive putrefaction and overgrowth of other microorganisms.

Subsequent samples of mud and water, collected from the stream above the site where the calf was found, contained S. typhi-murium. Interviews of two families living at the head water of the stream, directly above the location where the positive mud and water specimens were collected, revealed that both families had consumed raw milk purchased from the incriminated dairy. The septic tanks from the homes of these families drained into the stream.

It is impossible to determine precisely the initial source of S. typhi-murium contamination of the stream. A likely sequence of events was that the dead calf, who had died either because of salmonella septicemia or merely with a concurrent salmonella infection, had contaminated the water and initiated a cycle leading to contamination of the dairy cows, the raw milk, and the upstream families who consumed the raw milk.

The involved dairy has terminated its production of raw milk and is now marketing pasteurized milk exclusively. Other producers of raw milk in Yakima County are also switching to pasteurized milk, but raw milk is still marketed in many counties in Washington.

EDITOR'S COMMENT: This is the fifth and largest outbreak of salmonellosis due to ingestion of raw milk that has been reported to the Salmonella Unit. Two of the previous four outbreaks were due to S. typhi-murium, and three occurred in the western United States (California, Washington, and Idaho) where the practice of drinking raw milk is more common.

B. LOUISIANA

Familial Outbreak of Typhoid Fever

Reported by John A. Troutman, M.D., Chief, Section of Epidemiology, Division of Preventive Medicine, and Paul A. Marques, D.V.M., EIS Officer, Louisiana State Board of Health.

A familial outbreak of typhoid fever caused by Salmonella typhi, phage type B₂, occurred in northwestern Louisiana in December 1966 and January 1967. Eight of the 14 cases had symptoms of typhoid fever, but 6 were asymptomatic. The index case was reported from a rural section of Red River Parish, 30 miles south of Shreveport. The patient, a high school boy, began having sweats, chills, and fever on December 5. He continued to attend school until December 8, when he first consulted a physician and was found to have a temperature of 104° F. The physician gave him penicillin and streptomycin for 4 days, but his condition did not improve. He remained home in bed until December 18, when he was advised to go to a Shreveport hospital. After spending the night with relatives in Shreveport, he entered the hospital, where the diagnosis of typhoid fever was made on the basis of positive blood and stool cultures. He was treated with ampicillin and discharged on January 5. He again spent the night with his Shreveport relatives, went home, and 4 days later returned with his mother, father, two siblings, and an aunt to revisit the relatives in Shreveport.

Between January 10 and 23, 7 members of the Shreveport family developed symptoms typical of typhoid fever. Stool samples from the patient and 13 of his family or contacts were cultured and grew S. typhi, phage type B₂, although only 8 of these people had clinical signs of illness.

Epidemiologic investigation failed to reveal the original source of infection for the index case, but disclosed such unsanitary environmental conditions in both his and his relatives' home as to provide ample opportunity for spread of infection.

All cases are now completely well. Although serial stool examinations have not yet been completed in all patients, it appears that none of the patients have become carriers for S. typhi.

EDITOR'S COMMENT: In contrast to the other salmonellosis, the incidence of typhoid fever in the United States has been declining since World War II to the point that today typhoid fever can be considered an uncommon disease. There were 4,000 cases reported in 1946 and only 657 reported isolations in 1966. Since the establishment of the National Salmonella Surveillance Center, the numbers of reported S. typhi isolations per year has been as follows:

1963	--	706
1964	--	703
1965	--	719
1966	--	657
1967*	--	210

*January-April

Many of these isolations are obtained from carriers rather than clinical cases. For example, the 210 isolations reported so far this year can be broken down into carriers, clinical cases, or status unknown.

<u>Status</u>	<u>Number Persons</u>	<u>Percent</u>
Carriers	66	31.4
Cases	36	17.2
Unknown	<u>108</u>	<u>51.4</u>
Total	210	100.0

Because human isolations of S. typhi in this country show less seasonal variation than the other salmonellae, they account for a larger percentage of salmonella isolations during such "off-season" months of human salmonellosis as January through May and are relatively less common in summer and fall. The following table compares the average monthly incidence of human isolations of S. typhi with all other salmonella serotypes.

Month	Average Number* Isolations of <u>S. typhi</u>	Average Number* Isolations of All Other Salmonella Serotypes	Percent Salmonella Isolations Due to <u>S. typhi</u>
January	57	1469	3.7
February	58	1185	4.7
March	57	1338	4.1
April	47	1372	3.3
May	48	1472	3.2
June	71	1948	3.5
July	73	1790	3.9
August	59	1965	2.9
September	63	2259	2.7
October	57	1769	3.1
November	48	1710	2.7
December	51	1626	3.0

*Derived from figures reported to NCDC, Salmonella Unit, January 1964 - April 1967.

Though eradication of typhoid fever in this country is not yet possible, the epidemiology and control of this disease is much simpler than for the other salmonellosis. Man is the only known reservoir of S. typhi, in contrast to the ubiquity of hosts for many other salmonella serotypes, and a vigilant surveillance of known cases and carriers, coupled with appropriate medical therapy and judicious preventive measures, should lead to a continuing decrease of typhoid cases in this country.

C. ILLINOIS

Salmonella montevideo Outbreak Following a Smorgasbord Dinner

Reported by Norman J. Rose, M.D., Chief, Bureau of Epidemiology, T. J. Brophy, C. D. Investigator, and Walter F. Buell, M.D., EIS Officer, Illinois State Department of Public Health.

Forty-two cases of febrile gastroenteritis have been traced to a smorgasbord dinner served at a restaurant in a small town in eastern Illinois. Twenty-nine of the illnesses occurred in a group of students belonging to the Future Farmers of America from seven neighboring high schools who had gathered at the town for a field trip.

The trip ended with a large smorgasbord dinner, following which 22 students and 7 adults became ill with fever, cramps, and diarrhea. Seven persons were hospitalized, but there were no deaths. Incubation periods varied from 10 to 48 hours and averaged about 24 hours. Subsequent investigation of other groups which had eaten the meal disclosed 13 additional cases, giving a total of 42.

Because of a delay in notification of the outbreak and the large number of food items consumed, no specific vehicle could be identified by food histories. However, stool cultures obtained from 15 persons 2 weeks after the outbreak showed 8 persons positive for S. montevideo.

Investigation of the restaurant disclosed 1 environmental sample and 1 food handler positive for S. montevideo. It was impossible to conclude whether the food handler was responsible for the outbreak or merely another victim of it, but he has been removed from food preparation until his cultures become negative.

D. MARYLAND

Legislation Concerning the Sale of Live Baby Fowl as Pets

Reported by Kenneth L. Crawford, D.V.M., Chief, Division of Veterinary Medicine, Maryland State Department of Health.

A bill restricting the sale of live baby chicks, ducks, and other fowl under 3 weeks of age as pets was recently passed by the Maryland General Assembly and signed into law by the Governor. The Maryland State Department of Health was active in promoting passage of this legislation and examined chicks and ducks being offered for sale during the Easter seasons of 1965, 1966, and 1967 for the presence of salmonellae.

Sampling methods consisted of selecting 3 birds from a group of chicks or ducks and pooling the viscera of the birds. Using these methods, approximately 90 percent of the groups studied during the Easter seasons of 1965 and 1966 were found to contain salmonellae. Studies done during Easter week 1967 showed 12 of 18 groups of birds positive for salmonellae. Five serotypes were isolated: S. binza, S. livingstone, S. montevideo, S. thompson, and S. typhi-murium. At least 1 case of salmonella gastroenteritis acquired from a pet Easter chick was reported in 1967.

V. SPECIAL REPORTS

Recommendations of the Poultry and Egg National Board Salmonella Committee

The Poultry and Egg National Board Salmonella Committee met at the NCDC in Atlanta early in June and reviewed current problems of salmonellosis. It was the consensus of the group that the U.S. Department of Agriculture pasteurization requirements for liquid, frozen, and dried eggs and the U.S. Food and Drug Administration statement of policy in regard to salmonella contamination of animal feeds are very constructive steps toward the control of salmonellosis, but that there is great need for further implementation of these policies at the state level. The Committee recommended that the states be urged to enact regulations requiring adoption of the USDA regulations regarding pasteurization of egg products as well as the FDA guidelines on animal feed. The group also reviewed the proposed international guidelines developed recently by a committee of World Veterinary Food Hygienists and concurred with the principles expressed. These guidelines will be submitted to the World Veterinary Congress in July 1967 and will provide guides for both exporting and importing countries. Copies of these are available from Dr. E. H. Kampelmacher, National Institutes of Health, Utrecht, The Netherlands.

VI. INTERNATIONAL

A. AUSTRALIA

Report of Isolations of Salmonellae from Human and Nonhuman Sources in Australia, Fourth Quarter, 1966

Reported by Helen McDonald, B.Sc., Salmonella Reference Laboratory, Institute of Medical and Veterinary Science, Adelaide, Australia.

During the fourth quarter of 1966, 490 isolations were typed in the Salmonella Reference Laboratory. Of these, 96 were from human sources, 361 from animal sources, and 33 from miscellaneous sources including meat and meat meal. The three most frequently isolated serotypes from humans were as follows:

<u>Rank</u>	<u>Serotype</u>	<u>Number of Isolations</u>	<u>Percent</u>
1	<u>S. typhi-murium</u>	43	44.8
2	<u>S. muenchen</u>	9	9.4
3	<u>S. enteritidis</u>	4	4.2

The most common nonhuman sources of salmonellae were bovine (232), meat (62), meat meal (41), and chickens (20). A new serotype, S. cairns (45:K:e,n,Z₁₅), was isolated from a human source in Cairns, Queensland.

B. FRANCE

Salmonella Isolations in France, Second, Third, and Fourth Quarters, 1966

Reported by Drs. L. and S. LeMinor, Institut Pasteur, Paris, France.

Serotyping of salmonella specimens during the last three quarters of 1966 was performed at the Pasteur Institute and revealed that the five most frequent serotypes isolated from Frenchmen were:

<u>Rank</u>	<u>Serotype</u>	<u>Number of Isolations</u>
1	<u>S. panama</u>	481
2	<u>S. typhi-murium</u>	217
3	<u>S. oranienburg</u>	118
4	<u>S. paratyphi B</u>	64
5	<u>S. typhi</u>	55

C. ISRAEL

Salmonella Isolations in Israel, 1966

Reported by Ch. B. Gerichter, M.D., Ph.D., Director, Government Central Laboratories, Ministry of Health, Jerusalem, Israel.

During 1966, 4,477 isolations of salmonellae were serotyped in the National Salmonella Center of Israel. Of these, 3,788 were from humans and 689 from nonhuman sources. The seven most frequently isolated serotypes from humans and nonhumans were as follows:

<u>Rank</u>	<u>Serotype</u>	<u>Number of Isolations</u>	<u>Percent</u>
1	<u>S. typhi-murium</u> and <u>S. typhi-murium var.</u> <u>copenhagen</u>	988	26.1
2	<u>S. blockley</u>	439	11.6
3	<u>S. enteritidis</u>	297	7.8
4	<u>S. newport</u>	241	6.4
5	<u>S. emek</u>	218	5.8
6	<u>S. sofia</u>	209	5.5
7	<u>S. infantis</u>	173	4.6

NONHUMAN

<u>Rank</u>	<u>Serotype</u>	<u>Number of Isolations</u>	<u>Percent</u>
1	<u>S. typhi-murium</u> and <u>S. typhi-murium var.</u> <u>copenhagen</u>	250	36.3
2	<u>S. sofia</u>	90	13.1
3	<u>S. enteritidis</u>	62	9.0
4	<u>S. anatum</u>	46	6.7
5	<u>S. blockley</u>	45	6.5
6	<u>S. zanzibar</u>	29	4.2
7	<u>S. infantis</u>	28	4.1

Three new salmonella serotypes were identified in 1966 by the National Salmonella Center: S. sharon (11:k:l,6), S. herzliya (11:y:e,n,x), and S. haifa var. afula (1,4,12:Z₁₀:1,2).

During 1966, there were 1,225 strains of S. typhi-murium (including 467 of var. copenhagen) submitted for phage typing. The most frequent phage types found by the Felix and Callow phage typing scheme were:

S. typhi-murium: 1 (26.5%), 1a var. 2 (15.4%), 2 (8.8%), 1a (8.0%), and 1 var. 2 (3.6%)

S. typhi-murium var. copenhagen: 1a var. 2 (10.5%), 1 (10.1%), 1 var. 2 (8.1%), 1 var. 6 (4.5%), and 3a (1.7%)

D. NETHERLANDS

Reports of Salmonella Isolations, Third and Fourth Quarters, 1966

Reported from the National Salmonella Center, Netherlands.

During the last two quarters of 1966, a total of 4,177 human and 2,698 nonhuman salmonella isolations were typed by the National Salmonella Center. The five most common serotypes isolated from humans were:

<u>Rank</u>	<u>Serotype</u>	<u>Number of Isolations</u>	<u>Percent</u>
1	<u>S. typhi-murium</u>	2541	60.8
2	<u>S. stanley</u>	501	12.0
3	<u>S. panama</u>	468	11.2
4	<u>S. heidelberg</u>	89	2.1
5	<u>S. infantis</u>	<u>72</u>	<u>1.7</u>
	Total	3671	87.9
	Total (all serotypes)	4177	100.0

The most common sources of nonhuman isolations were cattle, pigs, chickens, sewage and surface water, and doves.

VII. FOOD AND FEED SURVEILLANCE

A. An Outbreak of Paratyphoid Infection Due to Salmonella typhi-murium in Adult Chickens

Abstracted from an article by M. Kashiwazaki, S. Aoki, T. Horiuchi, S. Shoya, and S. Namioka, National Institute of Animal Health Quarterly, 6:(3)144-151, 1966, Tokyo, Japan.

A field study of Salmonella typhi-murium infections in adult chickens was conducted on a farm near Tokyo. Blood tests indicated a successive spread of the infection among healthy chickens. S. typhi-murium was isolated from heart, liver, bile, spleen, pancreas, kidney, ovary, oviduct, bone marrow, unabsorbed yolk, rectal contents, and egg. Pathological examination revealed ovaries with abnormal follicles, slight pericarditis and peritonitis. Histopathological findings are discussed. Principal symptoms of chickens suffering from S. typhi-murium infection were diarrhea, weakness, and drowsiness.

B. A Five-Year Survey of the Incidence of Salmonellae in Avian Species

Abstracted from an article by G. P. Faddout and G. W. Fellows, Avian Diseases, 10:296-304, 1966.

During a 5-year period, 1960-1964, salmonellae were isolated from 245 of a total of 4,454 consignments of poultry. A total of 34 salmonella serotypes were identified during the survey. Salmonella chester was isolated 45 times during 1960 but not in any subsequent years. The only salmonella isolated from ovaries, other than S. pullorum, was S. enteritidis, which was isolated from the ovaries in 3 different chicken flocks, indicating that this serotype may be quite invasive and may tend to localize in the ovaries of chickens. Serotypes having greatest capacity to invade internal organs were S. typhi-murium, S. typhi-murium var. copenhagen, S. derby, S. anatum, and S. enteritidis. Serotypes which exhibited very little invasiveness were S. chester, S. infantis, S. blockley, S. newington, and S. give.

C. Veterinary Aspects of an Outbreak of Paratyphoid in Man

Abstracted from an article by Alexander Show, The State Veterinary Journal, 22:54-58, 1967.

A study was made of a Salmonella paratyphi B infection in a cow from a large herd in Lancashire, England. The milk was not heat treated and gave rise to extensive but mild infection in humans. The cow shedding the organism in its milk did not show any clinical signs of infection nor did two other cows in the herd that had high serum titers for S. paratyphi B. Seven of 8 dairy workers were found to be excretors. Approximately 879 positive human excretors were linked to this infected milk supply. Forty percent of the excretors were symptomless, 43 percent had mild symptoms, and 17 percent required medical attention. The infected milk supply was also linked to an infection in pigs which had consumed the milk.

D. Institute of American Poultry Industries Newsletter, March 15, 1967, p. 3, Chicago, Illinois

A federal grant of \$20,720 to trace how eggs and egg products contribute to salmonellosis in humans has been awarded by the Public Health Service to a team of investigators headed by Dr. Ralph A. Masterson, a veterinary epidemiologist in the Ohio Department of Health, Columbus, Ohio.

TABLE I
COMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS IN THE UNITED STATES DURING **APRIL, 1967

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																											SEROTYPE										
	NEW ENGLAND						MIDDLE ATLANTIC					EAST NORTH CENTRAL					WEST NORTH CENTRAL					SOUTH ATLANTIC																
	ME	NH	VT	MASS	RI	CONN	TOT	NY-A	NY-BI	NY-C	NJ	PA	TOT	OHIO	IND	ILL	MICH	WIS	TOT	MINN	IOWA	MO	ND	SD	NEBR	KAN	TOT		DEL	MD	DC	VA	WV	NC	SC	GA	FLA	TOT
anatum				1	1		3		1			1			1			1																		2	2	anatum
bareilly										1		1		1				1																				bareilly
berta																																						berta
blockley				15		3	18		3	1	1	5	4		4	2		10			2						2	1	1		1	5			4	12	blockley	
braenderup				1			1		2			3																										braenderup
bredeney									2			2									1						1									1	2	bredeney
chester											3	3							1								1										2	chester
cholerae-suis v kun																																					2	cholerae-suis v kun
cubana				1		1	2																				2									1	1	cubana
derby											1	1																								1	1	derby
enteritidis				3			3	3	5		9	17	9	3	11	3	5	31	3	1	2							6		8	5	2	2	4	4	25	enteritidis	
give																																						give
heidelberg	1			4		1	6	3	3	3	4	13	15	1	6	5	27	3									1		2		2	13	4	5	26	heidelberg		
indiana				1			1			1	1	1																										indiana
infantis				4			4	1	1	1	7	10				5	2	7	1							1	7	9	1	2	3	3	1	10	infantis			
java											1	1	1		7		1	9	1								1		1					3	5	java		
javiana													2					2									1							4	4	javiana		
kentucky																																						kentucky
litchfield															1			1																				litchfield
livingstone																											3			1						1		livingstone
manhattan				1		1	2				3	3	1		3	1	5											2					2	1	5	manhattan		
meleagridis				1			1								1		1																				meleagridis	
miami																																				1	1	miami
mississippi				1		3	4	2			3	5	5			1	1	7									2						1	2	2	5	mississippi	
montevideo																																						montevideo
muenchen				1			1											1																	4	4	muenchen	
newington																																					newington	
newport								1	1	1	1	4			4	2	6	2		1						2	5			3			8	11	newport			
oranieburg				3			3	1	3		1	5	1		5		1	7	2							2	1	1		1		2		6		oranieburg		
panama								1			2	3																							1	1	panama	
paratyphi B				1			1																				1										paratyphi B	
poona				3			3																															poona
saint-paul				3			3																															saint-paul
san-diego				3			3																															san-diego
schwarzengrund				12			12																															schwarzengrund
senftenberg																																						senftenberg
tennessee						1	1	2				3															1									2	2	tennessee
thompson				5			5	2	2		5	9			1	2	3	6	1									2						1	3	6	thompson	
typhi				2			2																															typhi
typhi-murium	2			23	2	6	32	22	21	6	22	71	14	14	23	16	4	71	6	2	9					12	31	16	3	15	11	11	15	71	typhi-murium			
typhi-murium v cop											1	4	5						2																		typhi-murium v cop	
urbana				2			2																														urbana	
weltevreden																																						weltevreden
worthington																																						worthington
untypable, group B				1			1																															untypable, group B
untypable, group C1						2	2																															untypable, group C1
untypable, group C2																																						untypable, group C2
untypable, group D											1		1																									untypable, group D
untypable, group E																																						untypable, group E
untypable or unknown				1	1		2				1							1	1								1		1							1	untypable or unknown	
TOTAL COMMON	3	0	2	88	5	19	117	0	43	46	16	66	171	57	20	82	48	19	226	25	5	21	2	3	0	21	77	5	43	11	29	0	39	0	39	63	229	TOTAL COMMON
TOTAL OTHER	0	0	0	2	0	0	2	0	1	1	0	1	3	1	1	2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	7	13	TOTAL OTHER	
GRAND TOTAL	3	0	2	90	5	19	119	0	44	47	16	67	174	58	21	84	48	19	230	25	5	21	2	3	0	21	77	5	43	11	29	0	42	0	42	70	242	GRAND TOTAL

(New York, A-Albany, BI-Beth Israel, C-City)

** Includes March late reports.

*The Beth Israel Salmonella Typing Center in New York is a reference laboratory and processes many cultures from other states which are assigned to the respective states although reported by NY-BI. Beth-Israel reported a total of 101 isolations for April.

TABLE I (Continued)
COMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS IN THE UNITED STATES DURING **APRIL, 1967

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																OTHER VI	APRIL 1967			APRIL 1966			APRIL 1966								
	EAST SOUTH CENTRAL				WEST SOUTH CENTRAL				MOUNTAIN				PACIFIC					TOTAL	%	TOTAL	%	TOTAL	%									
	TX	TN	AL	MS	LA	OK	TX	MT	CO	NM	AZ	UT	CA	AK	HI	AL								MS	HI	AL	MS	HI				
anatum					2																	12	1.0	78	1.5	92	1.7					
barlilly																						3	0.2	14	0.3	14	0.3					
bertha																						2	0.2	11	0.2	15	0.3					
blockley			1	2																		65	5.2	178	3.4	141	2.6					
braenderup																						5	0.4	25	0.5	36	0.7					
bredeney																						8	0.6	41	0.8	39	0.7					
chester																						6	0.5	34	0.6	31	0.6					
cholerae-suis v kun																						3	0.2	6	0.1	10	0.2					
cubana																						10	0.8	24	0.5	67	1.2					
derby					1																	26	2.1	107	2.0	93	1.7					
enteritidis																						92	7.3	274	5.2	322	6.0					
give																						3	0.2	23	0.4	24	0.5					
haidelberg																						136	10.8	501	9.5	414	7.8					
indiana																						3	0.2	17	0.3	26	0.5					
infantis																						62	4.9	267	5.1	489	9.2					
java																						21	1.7	96	1.8	46	0.9					
javiana																						15	1.2	65	1.2	49	0.9					
kentucky																						2	0.2	10	0.2	5	0.1					
litchfield																						1	0.08	21	0.4	19	0.4					
livingstone																						7	0.6	23	0.4	10	0.2					
manhattan																						19	1.5	102	1.9	30	0.7					
metegridis																						2	0.2	8	0.2	18	0.3					
mississippi																						4	0.3	14	0.3	14	0.3					
montevideo																						32	2.5	73	1.4	103	1.9					
maranchen																						10	0.8	59	1.1	54	1.0					
newington																						1	0.08	33	0.2	8	0.2					
newport																						45	3.6	255	4.8	314	5.9					
orantienburg																						33	2.6	100	1.9	149	2.8					
panama																						10	0.8	62	1.2	62	1.2					
paratyphyl B																						4	0.3	28	0.5	47	0.9					
poona																						2	0.2	15	0.3	16	0.3					
salit-pauli																						32	2.5	207	3.9	183	3.5					
san-diego																						6	0.5	35	0.6	29	0.5					
schwarzengrund																						15	1.2	32	0.6	19	0.4					
seinfenberg																						4	0.3	14	0.3	18	0.3					
temesse																						3	0.4	28	0.3	31	0.7					
thompson																						31	2.5	102	1.9	103	2.0					
typhi																						51	4.0	210	4.0	207	4.0					
typhi-murium																						384	30.8	1,553	29.4	1,492	28.2					
typhi-murium v cop																						12	1.0	75	1.4	47	0.9					
urbana																						1	0.08	4	0.1	5	0.1					
weltroden																						3	0.2	26	0.5	3	0.1					
wortlington																						1	0.08	10	0.2	17	0.3					
untyphal, group B																						13	1.0	98	1.9	81	1.5					
untyphal, group C1																						6	0.5	86	1.6	39	0.7					
untyphal, group C2																						0	0.0	9	0.2	9	0.2					
untyphal, group D																						2	0.2	18	0.3	12	0.2					
untyphal, group E																						0	0.0	4	0.1	5	0.1					
untyphal or unknown																						7	0.6	50	0.9	22	0.5					
TOTAL COMMON	1	11	1	2	15	7	48	6	42	103	2	0	2	33	8	4	12	0	61	25	13	156	0	27	221	1,220	97.1	5,110	96.7	5,157	96.9	
TOTAL OTHER	1	2	0	0	3	0	2	0	1	3	0	0	0	1	0	0	0	0	1	1	0	4	0	2	2	7	36	2.9	176	3.3	163	3.1
GRAND TOTAL	2	13	1	2	18	7	50	6	43	106	2	0	2	34	8	4	12	0	62	26	13	160	0	29	228	1,256	5,286	5,320				

TABLE II
OTHER SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING APRIL, 1967

SEROTYPE	R E P O R T I N G C E N T E R																	APR. TOTAL	JAN- APR. TOTAL	SEROTYPE		
	CAL	COLO	FLA	GA	HAI	ILL	IND	KY	LA	MASS	NY-BI	NY-C	NC	OHIO	PA	TENN	TEX				WASH	
atlanta				1						1	1								1	1	2	atlanta
bovis-morbificans																					3	bovis-morbificans
brancaster																					1	brancaster
california							1	1													4	california
cerro						1		1													4	cerro
dublin	1											1									1	dublin
durham																					6	durham
eimsbuettel			1	1									1								9	eimsbuettel
gaminara	1				1																3	gaminara
grumpensis																					1	grumpensis
habana			5																		8	habana
irumu		1																			4	irumu
lindenburg													1				1				1	lindenburg
london																					2	london
mission														1							6	mission
muenster																1					12	muenster
new-haw	1																				1	new-haw
norwich			1																		6	norwich
ohio													1								1	ohio
oslo	1				1																6	oslo
paratyphi-A				1																	1	paratyphi-A
reading						1				1											19	reading
rubislaw									2				1						1		9	rubislaw
TOTAL	4	1	7	3	2	2	1	1	2	2	1	1	3	1	1	2	1	1			36	TOTAL

TABLE III

Age and Sex Distribution of Individuals Reported as Harboring Salmonellae
During April 1967

<u>Age (Years)</u>	<u>Male</u>	<u>Female</u>	<u>Unknown</u>	<u>Total</u>	<u>Percent</u>	<u>Cumulative Percent</u>
< 1	84	87	1	172	20.4	20.4
1 - 4	137	93		230	27.3	47.7
5 - 9	49	47		96	11.4	59.1
10 - 19	36	36		72	8.5	67.6
20 - 29	30	42		72	8.5	76.1
30 - 39	24	35		59	7.0	83.1
40 - 49	16	20		36	4.3	87.4
50 - 59	24	17		41	4.9	92.3
60 - 69	12	14		26	3.1	95.4
70 - 79	9	17	1	27	3.2	98.6
80 +	<u>5</u>	<u>8</u>	<u>—</u>	<u>13</u>	1.5	100.1
Subtotal	426	416	2	844		
Child (Unspec.)	2	5	1	8		
Adult (Unspec.)	1	12	2	15		
Unknown	<u>190</u>	<u>178</u>	<u>21</u>	<u>389</u>		
Total	619	611	26	1256		
Percent of Total	50.3	49.7				

TABLE VI
OTHER SEROTYPES REPORTED DURING 1967
FROM NONHUMAN SOURCES

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
albany	Jan	Ky(2)	
	Feb	Ill(1)	
	Feb-Mar	Miss(15)	
	Mar	Ark (1)	
	Mar	Ohio(2)	21
	Mar	Ill	4
amager	Mar	La	1
arkansas	Jan	Ill(1)	
berta	Feb	Ariz(1)	2
	Jan-Feb	Ark(3)	
braenderup	Jan-Mar	Cal(2)	
	Jan-Feb-Mar	Conn(10)	
	Jan	La(8)	
	Feb	Tex(1)	
	Mar	Hai(6)	30
california	Jan	Ohio(1)	
	Feb	Ind(1)	
	Mar	Ill(1)	3
carrau	Jan	La	1
champaign	Feb	Minn	1
cholerae-suis	Jan	Cal(1)	
	Jan	Ohio(1)	
	Mar	Va(1)	3
corvallis	Jan-Feb	La	3
eastbourne	Jan	Minn	1
gallinarum	Jan	Ark	2
grumpensis	Jan	La	2
hartford	Jan	Hai	1
indiana	Jan	Ind(2)	
	Jan	NC(1)	3
javiana	Jan-Feb	La(7)	
	Jan	Mo(1)	8
johannesburg	Jan	Utah	1
litchfield	Feb-Mar	Va	2
minneapolis	Feb	Ohio	9
minnesota	Jan	Conn(1)	
	Jan-Feb	La(6)	
	Feb-Mar	Ill(2)	
	Feb	Utah(1)	
	Mar	Mo(1)	11
mississippi	Feb	La	2
mokola	Feb	La	1
muenster	Jan	Ark(2)	
	Jan-Feb	La(4)	6
okerara	Feb	La	1
oslo	Feb	Fla	2
pomona	Jan	La	1
redlands	Feb	La	1
shubra	Feb	La	1
taksony	Jan-Feb	Utah	2
thomasville	Jan-Mar	Iowa(3)	
	Jan	La(1)	
	Mar	Ill(1)	5
tucson	Feb	Cal	1
typhi-suis	Jan	Minn(1)	
	Mar	Cal(4)	5
urbana	Feb	Ill(1)	
	Feb	La(1)	
	Mar	Cal(2)	
	Mar	Conn(2)	6
	Feb	La	1
vejle	Jan-Mar	Ill(2)	
westhampton	Jan-Feb	La(9)	11
wichita	Feb	Utah	1
TOTAL			156

